

**Max. Marks: 75**

Class: TE

Course: Fundamentals of Industrial Automation

Program: Electronics Engineering

Duration: 3hr

Semester: V

Course Code: DJ19ELHN1C1

Instructions:

- (1) All Questions are Compulsory.
- (2) Assume suitable data wherever required, but justify it.
- (3) All questions carry equal marks.
- (4) Figure to the right indicate full marks.

Question No.		Max. Marks
Q1(a)	Temperature is to be measured in the range of 2500C to 4500C with an accuracy of $\pm 20^{\circ}\text{C}$. The sensor is a resistance that varies linearly from 280Ω to 1060Ω for this temperature range. Power dissipated in the sensor must be kept below 5mW. Develop analog signal conditioning that provides a voltage varying linearly from -5 to +5 V for this temperature range. The load is a high-impedance recorder	07
	OR	
Q1(a)	Sensor resistance varies from 25Ω to $1.5\text{ k}\Omega$ as a variable changes from minimum to maximum. Design a signal-conditioning system that provides an output voltage varying from -2 to +2 V as the variable changes from min to max. Power dissipation in the sensor must be kept below 2.5 mW.	07
Q1(b)	Explain in detail various strategies used for automation of production systems. Comment on the various types of automation.	08
Q2 (a)	Explain the basic principle of Wheatstone bridge and its use, with a relevant example. What is lead compensation and why exactly is it required.	10
Q2 (b)	Describe briefly implementation of a latch using relays.	05
	OR	
Q2 (b)	Explain briefly the need for serial communication protocol RS-232C – features and specifications.	05
Q3 (a)	What are the various types of thermocouples and thermoelectric laws in light of a thermopile.	05
Q3 (b)	Discuss briefly the temperature sensing mechanisms using RTD & thermistors, examples of practical application and specification details. Comment on their limitations too.	10
	OR	
Q3 (b)	Discuss briefly the temperature sensing mechanisms using thermocouples & semiconductor temperature sensor like LM35, examples of practical application and specification details. Comment on their limitations too.	10
Q4 (a)	Explain the need for and working of an FRL system.	08
	OR	
Q4 (a)	Write a note on and explain briefly the implementation of a DCS system.	08
Q4 (b)	Explain briefly various elements for ladder diagrams in PLC.	07



Shri Vile Parle Kelavani Mandal's

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Q5	Write brief notes on: i. Characteristics of ideal operational amplifier, in light of actual specifications of operational amplifier LM 741. ii. Principle, working and applications of Electric DC or AC motor	08 07
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